

Patent Claims

1. Method for determining and/or monitoring the volume flow rate of a medium flowing in a containment, wherein, from an ultrasonic transducer placed in a first position on the containment, measuring signals are emitted and wherein the measuring signals are received by an ultrasonic transducer placed in a second position on the containment, and wherein, on the basis of the measuring signals, or on the basis of measuring data obtained from the measuring signals, information is provided concerning the volume flow rate of the medium located in the containment,
characterized in that
the currently measured, actual measuring signals, or the corresponding actual measuring data, are compared with corresponding, stored, set measuring signals, or set measuring data, and
a report is issued, when a deviation arises between the set measuring signals, or set measuring data, and the actual measuring signals, or actual measuring data.
- 20 2. Method as claimed in claim 1,
characterized in that
signatures are derived from the actual measuring signals, or actual measuring data, and from the set measuring signals, or set measuring data, wherein the signatures describe each of the measuring signals sufficiently accurately.
3. Method as claimed in claim 1 or 2,
characterized in that
the set measuring signals are determined for not-filled containment (7)
30 and/or for filled containment (7).

4. Method as claimed in claim 1 or 2,
characterized in that
the actual measuring signals, or set measuring signals, and/or the
5 corresponding signatures are digitized and stored,
the actual measuring signals/actual measuring data, or the signature
determined from the actual measuring signals/actual measuring data,
are/is compared with the corresponding set measuring signals/set
measuring data or the corresponding signature of the set measuring
10 signals/measuring data, and
a report is issued, when a deviation arises between the actual and set
measuring signals/measuring data, or between the actual and set
signatures, which lies outside of a predetermined tolerance value.

15 5. Method as claimed in claim 4,
characterized in that,
on the basis of the comparison of the actual measuring signals/actual
measuring data, or on the basis of the comparison of the signatures of
the actual measuring signals/actual measuring data, with the set
measuring signals/set measuring data, or the corresponding signatures
20 of the set measuring signals/set measuring data, a statement is made as
to which defective system and/or process variable is causing the
deviation.

25 6. Method as claimed in claim 1 or 5,
characterized in that,
on the basis of the deviation, it is recognized
whether the containment (7) is not filled with the medium (10), and/or
whether the coupling of the ultrasonic transducers (3, 4) to the
30 containment (7) is defective, and/or

whether the damping of the measuring signals by the medium (10) located in the containment (7) exceeds a predetermined maximum value, and/or

whether an air gap between the containment (7) and a liner (13) on the

5 inner surface of the containment (7) is present, and/or

whether the damping of the measuring signals in the wall (8) of the containment (7) exceeds a maximum, predetermined amount.

7. Device for determining and/or monitoring the volume flow rate of a
10 medium in a containment with at least two ultrasonic transducers, wherein a first ultrasonic transducer is provided in a first position on the containment and wherein a second ultrasonic transducer is provided in a second position on the containment, and wherein a control/evaluation unit is provided, which determines the volume flow rate of the medium
15 located in the containment on the basis of measuring signals delivered by the ultrasonic transducers, or on the basis of the corresponding measuring data,

characterized in that

the control/evaluation unit (9) compares the currently measured, actual
20 measuring signals, or the corresponding actual measuring data, with corresponding, stored set measuring signals, or set measuring data, and the control/evaluation unit (9) outputs a deviation between the set measuring signals, or set measuring data, and the actual measuring signals, or actual measuring data.

25

8. Device as claimed in claim 7,

characterized in that

the control/evaluation unit (9) provides information concerning which defective system, and/or process, variable is causing the deviation.

30

9. Device as claimed in claim 7,
characterized in that
the arrangement of the ultrasonic transducers (3, 4) is a one-transverse
arrangement (1) or a multi-traverse arrangement.

5

10. Device as claimed in claim 7 or 9,
characterized in that
at least the two ultrasonic transducers (3, 4) having the greatest
separation from one another work alternatingly in emitting and receiving
10 operation.

11. Device as claimed in claim 7, 9 or 10,
characterized in that
the ultrasonic transducers (3, 4) are mounted on the containment
15 according to the clamp-on method.